REPORT No. 2

Linking pension benefits, pension finance, and pension investments together

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Keith P. Ambachtsheer, 1988

Public Sector Pensions Consultations

Linking Pension Benefits, Pension Finance, and Pension Investments Together
Report #2

Prepared by:

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1988

Ontario Public Sector Pensions Consultations

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THE PURPOSE OF THIS PAPER

This paper has been written to facilitate the Ontario public sector pensions consultations currently under way. Specifically, the paper examines the linkages between costing, funding, and investment policies in fully indexed, average final pay-based defined benefit pension plans. The examination yields a number of conclusions likely to be useful in the consultations process.

The paper is a short 7 pages. It draws heavily on two background analyses both of which are appended to this paper. The first is some work carried out by Mr. Peter Hirst of *ACTREX PARTNERS LIMITED*. Based on a number of simplifying assumptions, he performed a series of calculations linking pension plan investment results to funding implications. The second analysis is some work I did last year linking economics and capital market pricing in general, to pension investments in particular.

PAPER SUMMARY AND CONCLUSIONS

* FULLY INDEXED PENSION ENTITLEMENTS SHOULD BE VALUED (AND HENCE COSTED) ON A 3% REAL RATE OF RETURN BASIS;

* IT IS REASONABLE TO EXPECT A DIVERSIED PENSION FUND TO ACHIEVE A LONG TERM RATE OF RETURN 1-2% IN EXCESS OF THE 3% RISK-FREE RATE CURRENTLY APPROPRIATE FOR VALUING FULLY INDEXED PENSION ENTITLEMENTS;

* 20% OF PAY IS A REASONABLE APPROXIMATION FOR THE FUNDING RATE REQUIRED TO MAINTAIN FULLY INDEXED, AVERAGE FINAL PAY-BASED PLANS WITH A 2% BENEFIT IN BALANCE IF PENSION ASSETS EARN A 3% REAL RATE OF RETURN;

* THAT 20% CONTRIBUTION RATE WOULD GENERATE A CONSIDERABLE PLAN SURPLUS IF PENSION ASSETS EARNED 4-5% IN REAL TERMS OVER THE LONG TERM INSTEAD; AT 4% REAL, BALANCE WOULD BE ACHIEVED AT 15-16% OF PAY; AT 5% REAL, AN 11-12% OF PAY CONTRIBUTION RATE WOULD BE SUFFICIENT;

* HOWEVER, TAKING ON INVESTMENT RISK IN A PENSION PLAN ALSO MEANS THAT INVESTMENT RESULTS CAN BE BAD RATHER THAN GOOD; AMORTIZING UNSMOOTHED, (BUT REALISTICALLY DETERMINED) **BAD** INVESTMENT RESULTS COULD LEAD TO A 6-12% OF PAY **INCREASE** IN THE REQUIRED PLAN CONTRIBUTION RATE FOR FIVE CONSECUTIVE YEARS.

PROSPECTIVE INVESTMENT RETURNS

We commence by referencing Professor James E. Pesando's May 1988 paper *Choosing The Real Interest Rate To Value Fully Indexed Pensions* prepared for the Public Sector Pensions Consultations Group. Pesando argues persuasively for 3% as a realistic real return assumption on a portfolio of assets most likely to mirror/match/immunize a portfolio of inflation-indexed pension entitlements. Such a portfolio would have a lot of T-Bills in it, but might also have some short term Canada bonds and Inflation-Linked Mortgages as well.

Both theory and practice argue that if such a risk-free portfolio is likely to earn 3%, a diversified portfolio of investments each of which is **not** risk-free should earn **more**. How much more? Well, that depends on the amount of non-diversifiable risk the portfolio has in it.

Research supports (see my appended paper) an incremental 1% expectation as conservatively realistic for an asset mix 40% exposed to a diversified sub-portfolio of equity-oriented investments and 60% to a sub-portfolio of shorter term debt-oriented investments. For a 70-30 mix (with the 30% debt component now longer term), a 2% risk premium becomes conservatively realistic.

INVESTMENT RISK: FROM THEORY TO PRACTICE

If all the risks involved in single risky investments were **diversifiable**, then there would be no such thing as a risky portfolio. The fact that there are risky portfolios suggests that, unfortunately, all risks in single investments do **not** go away when they are combined into portfolios.

Systematic risks in securities that remain even in diversified portfolios mainly relate to **real economic growth** and **inflation**. More specifically, they relate to the **unpredictability** of these two systematic risk factors. What does this mean in practice?

It means simply that unanticipated changes in **real economic growth** will significantly impact the return prospects for most investments....especially **equity-oriented** investments. Similarly, unanticipated changes in **inflation experience** will also significantly impact the return prospects for most investments.... especially **debt-oriented** investments. Generally, changes **for the better** will boost return prospects, changes **for the worse** will lower them.

Specifically, we estimate that a 40-60 equity-debt mix would, over a four year period with either considerable growth-related or inflation-related turbulence, not have 4% real rate of return. Instead, its return is more likely to be 0%. In the case of the 70-30 mix, instead of 5%, it is more likely to be -2.5% per annum....or about a 10% drop in the real value of the portfolio over the four year period (again, see the appendix for more detail).

THREE POSSIBLE INVESTMENT POLICIES: A SUMMARY

Our discussion to this point has been carried out in the context of three possible investment policies for pension assets:

1. A zero-risk policy which would offer a close to 3% real return in good and bad investment markets;
2. A moderate risk policy (40-60) with moderate variability in its real rate of return;
3. A higher risk policy (70-30) with significant variability in its real rate of return.

The three policies are summarized below (the "shorter term" is a 3-5 year period, returns are on an annualized basis):

THREE INVESTMENT POLICIES

RISK LEVEL	LONG TERM REAL RETURN EXPECTATION		SHORTER TERM POSSIBILITY
ZERO (0-100)	3%	BUT....	3%
MODERATE (40-60)	4%	BUT....	0%
HIGHER (70-30)	5%	BUT....	-2.5%

CONTRIBUTION RATE IMPLICATIONS

The question we posed to Peter Hirst was:

"....what contribution rates are needed to fund a typical fully indexed, average final pay pension plan if pension assets earn (a) 3%, (b) 4%, (c) 5%....and what contribution rate ***increment*** *is needed to amortize (over 5 years) a deficiency that would arise from four years worth of bad investment news to the tune of (a) 0% and (b) -2.5% annualized....?*

His answer (see appendix for detail) is summarized below. The numbers for the 40-60 and 70-30 policies are expressed as decrements/increments from/to the basic 20% of pay contribution rate:

THREE INVESTMENT POLICIES

RISK LEVEL	LONG TERM CONTRIBUTION RATE EXPECTATION		SHORTER TERM POSSIBILITY
ZERO (0-100)	20%	BUT....	20%
MODERATE (40-60)	-4.7%	BUT....	+6.0%
HIGHER (70-30)	-8.3%	BUT....	+10.5%

WHICH INVESTMENT POLICY?

Mr. Malcolm Rowan chose to title his report on public sector pension fund investing in Ontario *"IN WHOSE INTEREST?"* The investment policy/contribution rate decision matrix above demonstrates the appropriateness of that choice. Clearly, it is impossible to choose one of the three policy options in the matrix without knowing who would gain from good investment results....and who would suffer from bad results. Mr. Rowan suggested this should be made clear in the pension "deal".

We examine two possibilities. Both "deals" involve the fully indexed, average final pay-based plan already specified. Both start with a 50-50 employer-employee (ER-EE in the matrixes below) split of normal plan cost estimated at 20% of pay. These costs are calculated using the recommended 3% real interest rate assumption.

In Deal #1 the plan sponsor bears all investment risk and hence is entitled to all investment rewards. Here are the choices facing the plan sponsor (again, the numbers beside the 40-60 and 70-30 policies are increments/decrements from the normal 20% of pay contribution rate):

THREE INVESTMENT POLICIES AND DEAL #1

RISK LEVEL	LONG TERM CONTRIBUTION RATE EXPECTATION		SHORTER TERM POSSIBILITY
ZERO (0-100)	ER 10% EE 10%	BUT.... BUT....	ER 10% EE 10%
MODERATE (40-60)	ER -4.7% EE 0%	BUT.... BUT....	ER +6.0% EE 0%
HIGHER (70-30)	ER -8.3% EE 0%	BUT.... BUT....	ER +10.5% 0%

In Deal #2 the plan sponsor and plan participants agree to split the consequences of both good and bad investment results 50-50. The choices facing both parties now **jointly** are:

THREE INVESTMENT POLICIES AND DEAL #2

RISK LEVEL	LONG TERM CONTRIBUTION RATE EXPECTATION		SHORTER TERM POSSIBILITY
ZERO (0-100)	ER 10% EE 10%	BUT.... BUT....	ER 10% EE 10%
MODERATE (40-60)	ER -2.4% EE -2.4%	BUT.... BUT....	ER +3.0% EE +3.0%
HIGHER (70-30)	ER -4.2% EE -4.2%	BUT.... BUT....	ER +5.3% ER +5.3%

DECIDING

Public sector employees and the Province have reached an important crossroads in their pension "deal" deliberations. Taking the current situation to be unsatisfactory to all parties, there appear to be two viable alternatives. The parties could decide to go to a combination defined benefit\defined contribution plan....or they could decide to stay totally within the defined benefit environment....but with an internally consistent 'package' of benefits, contribution rates, and investment policy all resulting from a negotiation process.

Either way, both plan participants and the Government will need to think carefully about how to best balance risk and reward in striking an appropriate investment policy either separately....or jointly. We close by offering the wisdom of proverb writers through the ages. Wisely, they present both sides of the investment risk argument. On the one hand they say:

* *"an ounce of fortune is worth a pound of forecast"*
* *"a bird in the hand is worth two in the bush"*
* *"the unexpected always happens"*
* *"at a great bargain....pause!"*
* *"losers are always in the wrong"*

But on the other hand, the proverb writers also say:

* *"nothing ventured, nothing gained"*
* *"they deserve not the sweet that will not taste the sour"*
* *"they that can not abide a bad market do not deserve a good one"*
* *"those that are too secure are not safe"*
* *"no rose without a thorn"*

If this paper has shed some insight into the potential **magnitudes** of the forecasted fortunes....of the bird in the hand and the two in the bush....of the great bargain and the hitch in winning it....of the sweet and the sour....of the good markets and the bad ones....of the rose and its thorn....then the paper has served its purpose.

APPENDIX I

ACTREX
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May 12, 1988

VIA FAX

Mr. Keith P. Ambachtsheer
Keith P. Ambachtsheer & Associates
128 Glencairn Avenue
Toronto, Ontario
M4R 1M9

Dear Keith:

RE: Pension Plan Funding Illustrations

Further to our discussion last week, I am enclosing a summary of the calculations we have completed. I think you will probably find these reasonably straightforward, but the following additional explanations may be helpful.

The Plan and assumptions have been designed to produce a funding rate of 20% of salary, whether we use the entry age normal or the unit credit method of funding. The Plan is supposed to represent something close to the Ontario Public Sector Plan, while the assumptions are along the lines of what we discussed last week. The "Average" employee is probably not dissimilar to the average employee in the Public Sector Plan.

Assuming nil mortality and turnover before retirement is conservative. Another way of describing this is to say that on death or termination prior to retirement, the full accumulated funds would be payable to the individual or his beneficiary. Even under the new Ontario legislation, this is not required since the amount paid out is based on salaries at time of death or termination, rather than salaries projected to retirement. However, for the purposes of this exercise, I am not sure that this is particularly material.

With respect to the funding rates, I have shown the rates payable on the entry age normal method, and on the unit credit method. As you can see, at attained age 44 the unit credit funding rates are the same as, or very similar to the entry age normal rates. However, the unit credit method provides lower funding rates at the lower ages, and higher funding rates at the higher ages than under the entry age normal method. For illustration, I have

shown the rates in the year of entry (age 30) and in the final year (age 59). Remember, we are assuming a retirement age of 60. It is interesting to note the sharp decrease in the required funding rate for each additional 1% of investment return, the point you make in your article.

With respect to the deficiency calculations on the third page, we have assumed the adverse experience occurred over the last four years. In relation to our "average" employee, this means from age 40 to age 44. The additional payments required to fund the deficiency are slightly lower for the unit credit method than the entry age normal method. This is because the entry age normal method builds up a bigger fund in the earlier years than does the unit credit method, so the adverse investment experience has a greater effect. I would also draw your attention to the notes at the bottom of this page.

These figures have some interesting implications, and I am looking forward to seeing what conclusions you draw from them. I would be pleased to discuss these with you if you so desire.

Keith, give me a call if you need any additional information or any further calculations done.

Kind regards.

Yours sincerely,

Peter C. Hirst

PCH/vs
Encls.

c.c. : Dr. David Slater

PENSION PLAN FUNDING ILLUSTRATION

May, 1988

PLAN:

- 2% final 3-year average salary;
- Normal retirement age 65;
- Early retirement available - reduction of 5% for each year of early retirement;
- Pension payable on joint and last survivor basis, 67% continuing to surviving spouse;
- Pension fully indexed to C.P.I.

ASSUMPTIONS:

- "Average" employee joined plan age 30, current age 44;
- Inflation rate: 5% per annum;
- Investment earnings: 8% per annum (i.e. 3% real rate);
- Salary escalation: 6.5% per annum (i.e. inflation + 1.5%);
- Wife 3 years younger than male member;
- Mortality after retirement: GAM 83 Table;
- Mortality and turnover before retirement: nil;
- Retirement age: 60.

FUNDING RATES AS % OF SALARY

I Assumed Real Rate of Return: 3%

Entry Age Normal ("Level Premium"):		20.0%
Unit Credit ("Single Premium"):	(Age 30:	16.4%)
	Age 44:	20.0%
	(Age 59:	24.6%)

II If Assumed Real Rate of Return 4% Instead of 3%

Entry Age Normal:		15.3%
Unit Credit:	(Age 30:	11.1%)
	Age 44:	15.4%
	(Age 59:	21.8%)

III If Assumed Real Rate of Return 5%

Entry Age Normal:		11.7%
Unit Credit:	(Age 30:	7.6%)
	Age 44:	12.0%
	(Age 59:	19.4%)

ASSUMING FUNDING IS BASED ON 3% REAL RATE OF RETURN, WHAT IF, OVER THE LAST FOUR YEARS, FUNDS HAD EARNED ONLY:

(i) 2.6% P.A. (I.E. - 2.4% P.A. REAL REATE OF RETURN)

(ii) 5% P.A. (I.E. ZERO REAL RATE OF RETURN)

(IGNORE ANY SURPLUS OR DEFICIT AT BEGINNING OF FOUR-YEAR PERIOD, OR ASSUME THERE TO BE NONE)

FUNDING OF DEFICIENCY AS A PERCENTAGE OF SALARY :

		4-YEAR REAL RETURN (i) - 2.4%	(ii) ZERO
(i)	Over Next 5 Years:		
	- Entry Age Normal:	10.5%	6.0%
	- Unit Credit:	9.0%	5.1%
(ii)	Over Next 15 Years:		
	- Entry Age Normal:	3.7%	2.1%
	- Unit Credit:	3.2%	1.8%

NOTE: 1. Above is based on our "average" employee. No inactives are included. If these represented X% of total liabilities and funds, then above figures would increase by roughly X%. (In case of PSSF, X% is approximately 30% - 40%, according to December 31, 1986 report.)

2. In the "rising inflation" scenario (i), the above may be exacerbated by deficiencies created by salary increases in excess of assumed rate (e.g. early and mid-1970s). In the "deflation" scenario (ii), the above may be eased by salary increases lower than assumed (e.g. 1980s).

However, what influence should all this have on future assumptions and/or smoothing techniques?

APPENDIX II

PENSION FUND ASSET ALLOCATION:

ARE EQUITY INVESTMENTS 'PRUDENT'?

by Keith P. Ambachtsheer

(Keith P. Ambachtsheer is the publisher of THE AMBACHTSHEER LETTER which provides regular commentary on pension governance, finance, and investments. This paper won two 'best paper' awards, one from the Toronto Society Of Financial Analysts, the other from the Financial Analysts Journal.)

Article Precis

Recent changes in regulatory and accounting rules are leading to a fundamental reexamination of pension fund asset mix policy by pension plan sponsors. Both the new 'prudence' standard and the concern that the new pension accounting rules will results in an undesirable degree of financial statement volatility are leading to questions about the role of equity investments in pension funds.

A careful examination of the nature of pension liabilities leads to the conclusion that there are not one, but two types of pension liabilities a plan sponsor could choose to invest against. The liability type chosen has a major impact on what constitutes balance sheet risk and the risk-minimizing asset mix policy for a defined benefit pension plan.

The 'legal termination' liability choice pulls asset mix policy in the direction of a long duration fixed-rate bond portfolio. The 'economic going-concern' liability choice pushes asset mix policy away from the all-bond policy towards equity-oriented investments. Actual plan sponsor behavior suggests most are choosing the 'economic going-concern' type as their operative pension liability.

This article examines the implications of deciding to invest against 'economic going-concern' liabilities. It turns out that the typical '50-50' equity-debt mix is one of a number of possible prudent policy choices that can be made in this case.

Balance Sheet Management: From Concept To Application

There has been significant movement during the last several years in how practitioners are approaching pension fund asset allocation. The idea that long term asset mix policy should not be set without reference to the pension liabilities being invested against is now part of conventional wisdom.

The new pension plan accounting rules [1] have played a major role in getting plan sponsors to focus on the plan balance sheet in deciding asset mix policy. The financial status of the pension plan is now visibly linked to the financial status of the plan sponsor through the plan sponsor's financial statements. Chief Financial Officers have finally become avid students of pension fund asset allocation!

The other development that has the CFO's attention currently focused on pension fund asset mix policy is pension reform, especially the new pension investment regulations which are based on the 'prudent person' philosophy. The new regulations require that plan sponsors develop statements of investment policy. The heart of such statements will be the question of how to approach pension fund asset mix policy.

But now that we have CFOs' attention, what do we <u>tell</u> them? Unfortunately, the answer to this question is not as simple as it might, at first blush, seem. The reason is that there are, at any point in time, not one, but <u>two</u> pension liabilities. In this article we will refer to them as the 'legal termination liability' and the 'economic going-concern liability'.

Pension plan balance sheet management is further complicated by the fact that it is not simply a case of one liability definition being wrong and the other right. <u>Both</u> are legitimate pension finance concepts. There is one final complication. And that is that the two liabilities lead

to very different implications for what constitutes balance sheet risk in a pension plan, and hence what constitutes an appropriate asset mix policy.

Why Are There Two Legitimate Liability Definitions?

There is a simple reason why there are two legitimate liability definitions in defined benefit employer pension plans. It is because once a plan exists, the employer has the option to either continue the plan....or to terminate it. And in that option lies a great anomaly in corporate and public finance. Why? Because for a typical defined benefit pension plan, the 'best estimate' continuation liability at any point in time has a much greater value than the termination liability.

In his 1986 Financial Analysts Journal (FAJ) article THE ECONOMIC BURDEN OF PENSION LIABILITIES [2] Ippolito provided a vivid example of the potential value disparity between the two liabilities. He estimated that for a typical 55 year old worker the 'economic going-concern' pension liability might be at least 2.7 times the value of the 'termination' liability. Similarly, Ezra and Ambachtsheer in their 1985 FAJ article PENSION FUNDS: RICH OR POOR? [3] reported a median 3:1 ratio between these two liability levels in a sample of 146 defined benefit plans.

The reason for the disparity is simple. The 'economic going-concern' liability reflects an assumption that the pension benefits accruing will actually be paid out over time and that the nominal dollar value of the benefit payments over time will reflect actual inflation experience over time. By contrast, the 'termination' liability simply reflects the price of a basket of fixed dollar current and deferred life annuities. These annuities, priced at current interest rates, would be just sufficient to discharge pension obligations earned to date based on today's compensation rates.

This article will not burden itself with the economic, legal and even moral issues surrounding this going-concern/termination value disparity [4]. It simply takes it as a "given" and will focus instead on the investment implications of these two possible views of pension liabilities.

Choice #1: The Termination View

Fortunately, this article also need not burden itself with a detailed exposition of the investment implications when one takes the termination view of pension liabilities. Since the beginning of 1986, Martin L. Leibowitz of Salomon Brothers has set out this case for FAJ readers in painstaking detail in four articles. A fifth appeared recently in the Journal of Portfolio Management [5].

The logic of the Leibowitz pension fund asset allocation framework hinges on two critical assumptions:

1. The pension liability relevant for making asset allocation decisions is the plan 'termination liability'.
2. The plan 'termination liability' is fixed in nominal terms.

Making these two assumptions is not without merit. After all, regulations require trusteed pension funds to be managed "....solely in the interest of plan beneficiaries.....". Taken literally, this means the only role of the pension fund is to ensure there is enough money available to pay the accrued pension debt if, for some reason, the plan sponsor either can't or no longer wants to. And if the plan sponsor can't or no longer wants to pay, the plan is clearly in a termination situation.

As for the 'termination liability' being fixed in nominal terms, this is still the standard legal interpretation of what is owed in the plan windup case. That is, that there is no legally enforcable obligation to provide a termination quid-pro-quo for any explicit or implicit

understanding that the plan, as a going-concern, was to provide inflation-related benefits [6].

The Investment Implications Of The Termination View Of Pension Liabilities

The termination formulation of the pension fund asset allocation question has at least two happy consequences. The first consequence, that the question has a simple answer, should make all who concern themselves with pension fund asset allocation happy. The second consequence, that a long duration fixed-rate bond portfolio turns out to be the risk-free asset, should make the people who manage, trade, and position bond portfolios doubly happy.

The reason the answer to the question lies in the direction of a long duration all-bond portfolio is quite straightforward. Fixed dollar pension plan termination liabilities can be discharged with the purchase of a portfolio of current and deferred annuities. Depending on the mix of active and retired lives and their respective age distributions, the duration of such a portfolio might be somewhere between 10 and 15 years [7].

Liabilities with this duration are well within the duration reach of an asset portfolio of zero coupon bonds. By matching asset and liability durations, any existing 'termination surplus' (plan assets in excess of the plan 'termination liability') can be locked in. In the 'termination' framework, both short term debt securities and stocks are risky. Both have nominal interest rate-related durations that are far too short. In addition, stock prices move up or down for reasons totally unrelated to changes in interest rates.

Pension Plan Sponsors And the 'Termination Liability' Framework

Despite the logic of the 'termination' view of pension liabilities, very few pension funds have 100% bond asset mix policies. The fact that actual pension fund asset mixes deviate significantly from the risk-free portfolio suggested by the 'termination liability' framework (the typical Canadian trusteed pension fund has a 50% equities-50% fixed income asset mix) can be explained by one of two reasons:

1. Plan sponsors use the 'legal termination liability' framework but willingly assume considerable balance sheet risk in framing their asset mix policies.

2. Plan sponsors don't use the 'nominal termination liability' framework in framing their asset mix policies.

Reason #1 doesn't strike us as very plausible. We don't perceive pension plan sponsors in aggregate to be aggressive risk takers in managing pension plan balance sheets. Reason #2 seems more plausible. That is, plan sponsors rightly or wrongly don't accept the two critical assumptions about 'time' (ie finite-life pension liabilities ...and hence assets) and 'the nature of the pension promise' (ie nominal rather than inflation-sensitive) behind the 'termination' view of pension liabilities.

This second interpretation is supported by Malley and Jayson in their 1986 FAJ article WHY DO FINANCIAL EXECUTIVES MANAGE PENSION FUNDS THE WAY THEY DO? [8] Their surveys and interviews with financial executives indicated much more of a 'going-concern' rather than 'termination' mentality among respondents in making funding and investment policy decisions.

Further support for the second interpretation comes from the fact that the funding process focuses on ongoing rather than termination pension benefits. Given the former require 2 or 3 times the amount of dollars to fund than the latter, plan assets tend to exceed the termination liability

by multiples of 2 or 3 in a typical plan (see Footnote [3]). Thus for most plans, solvency is not the central issue. Instead, the central issue is to earn a high long term rate of return on a pool of assets the value of which easily matches that of some of the plan sponsor's main line businesses.

Pension Plan Sponsors, 'Time', And 'The Pension Promise'

What happens to the asset allocation question when opposite assumptions are made about 'time' and 'the nature of the pension promise'? The assumptions now become:

1. The pension liability relevant for making pension fund asset allocation decisions is not the 'legal termination liability', but the 'economic, going-concern liability'.

2. The plan 'economic, going-concern liability' is not fixed in nominal terms. It is highly inflation-sensitive.

With these assumptions, the pension fund is much more likely to be viewed as a permanent tax-exempt capital pool, the return on which can be used to help discharge pension debt when it falls due. As to what direction the answer to the asset allocation question might now take us, there are 5 considerations. We list them as questions a plan sponsor might ask:

* How do we view long term capital market prospects?

* Is it clear that risk-related return gains in the pension fund do indeed translate into reduced employer contributions?

* While a plan termination is not expected, how would we "settle" with our current and former employees if it did occur?

* How concerned are we about shorter term fluctuations in the economic and/or accounting values of plan assets and plan liabilities....and hence the plan surplus (economic and/or accounting) position [9]?

* To what degree are we prepared to/can we integrate the main business and the pension plan balance sheet for capital structure and tax planning purposes?

The 5 Questions And Pension Fund Asset Allocation

We expand on these 5 questions for asset allocation against 'economic, going-concern pension liabilities' in TABLE I below:

TABLE I: 5 ASSET ALLOCATION CONSIDERATIONS

CONSIDERATION	*COMMENTARY*
1. Long Term Capital-Market Prospects	** Are there reasons to believe the historical structure of risk premiums will/will not be paid in the future? How do our views on this impact our choice of normal asset mix policy?*
2. The 'Going-Concern Deal'	** How are pension fund gains (ie return in excess the risk-free long term liability discount rate) to be distributed between the plan sponsor and plan beneficiaries? What about pension fund losses (ie return shortfalls)?* ** What do the answers to these questions tell us about how aggressive an asset mix policy to adopt?*
3. The 'Termination Deal'	** While we plan to run the business and the fund as going-concerns, there are a number of possible windup scenarios (ie conversion to a money purchase plan, corporate takeover/reorganization, bankruptcy). Will we <u>really</u> only pay plan members the absolute legal minimum? Or do we have a contract (explicit or implicit) to pay more?* ** How does this 'more' manifest itself? As the absolute legal minimum plus a share of the termination surplus? As an expected inflation-related or 'excess interest'-related increment to the legal minimum?*
4. Fluctuations in the Value of Plan Assets and Liabilities	** Are shorter term fluctuations in the economic (ie 'real') value of plan assets and plan liabilities of major concern to us? If yes, why? What about fluctuations in the <u>accounting</u> value of assets and liabilities? If yes, why?*
5. Degree of Business and Plan Integration	** We realize that full integration would have the pension fund invested in the most heavily taxed securities, with whatever offsets are needed on the main business balance sheet to give us the integrated asset/liability structure we want.*

* *Are we prepared to live with the potential consequences of full integration (ie strange looking non-integrated main business and pension balance sheets, possibly quiries from the tax authorities and rating agencies)?*

^^

The Right Solution For The Wrong Problem?

These 5 questions make it clear that pension plan balance sheet 'risk' takes on very different meanings depending on which of the two liability descriptions is most in line with plan sponsor perceptions. The Leibowitz formulation of the pension fund asset allocation problem based on the 'legal termination liability' has two obvious merits. It offers a legitimate specification of the pension plan balance sheet management problem. And it provides a clean solution to determining balance sheet risk and asset mix policy: the interest rate sensitivity of plan assets and liabilities tells all.

But, if most plan sponsors view pension liabilities on an economic, going-concern basis, then these merits may be overshadowed by the fact that, for most plan sponsors, the 'termination' solution may be solving the wrong problem. Which is a shame......because the solution to the 'economic going-concern liability' balance sheet management problem is not nearly as elegant as the 'termination' solution.

Choice #2: The 'Economic Going-Concern Liability'

When thinking about the pension investment problem shifts from a termination context to a long term, ongoing context, some interesting things happen. 'Risk' measured by the exposure of the 'termination surplus' (plan assets in excess of the plan termination liability) to changes in long term bond yields (ie the 'termination' formulation) is no longer relevant.

'Risk' now is related to actual real return experience in relation to anticipated real return experience. On a 3% real return basis, a 20% of payroll contribution rate might be needed to support plan benefit payments equal to 70% of final earnings and maintained in real terms over the life of the pensioner. But if a 6% real return is earned instead, the required contribution rate might be halved....into the 10% area. Thus real return uncertainty translates directly into 'contribution rate risk'.

Who bears this 'contribution rate risk'? That depends very much on what the pension 'deal' is between the employer and the employees. In a fully indexed, non-contributory defined benefit plan, which is being funded with, say, a 20% of payroll contribution rate, 'contribution rate risk' is fully borne by the employer.

If the pension fund earns a 3% real rate of return, there will be a long term balance between plan assets and plan (economic, going-concern) liabilities. If the fund earns more, assets grow faster than liabilities and the contribution rate can fall below 20%. If the fund earns less, assets grow slower than liabilities, and the contribution rate must rise above 20% [10].

What IS The 'Going-Concern Pension Deal'?

But what about more typical cases where, for example, a final earnings formula (possibly up to 50% of final pay) ensures pre-retirement indexation, but post-retirement indexation is 'ad hoc' and is not explicitly being pre-funded? Is the amount by which pensions are updated now dependent on pension fund performance? If there is a connection, you have a risk-sharing situation between the plan sponsor and plan members.

What about arrangements where the employer and the employees have agreed to split contributions, say 50%/50%, regardless of whether they amount to 5%, 10%, or 20% of pay? Again, a risk-sharing situation would

again appear to exist. Thus the plan member's risk exposure, like that of the plan sponsor, could also be in the form of contribution rate uncertainty, or it could be more direct in the form of real benefit payments uncertainty [11].

Is a discussion on the nature of the pension 'deal' a digression in an article on pension fund asset allocation? Definitely not! Probably the most fundamental requirement in the investment management profession is the 'Know Your Client' Rule. The obvious extension of this rule in the case of employer pension plans is to identify the financial risks and rewards inherent in any defined benefit pension arrangement and how they are to be shared by the stakeholders.

From the perspective of framing an asset mix policy, there is ideally only one stakeholder: either the plan sponsor or the plan member. With either, it is clear who the 'client' is. Unfortunately, as the above discussion shows, the 'deal' might well involve some sharing of investment gains and losses between these two parties. And that makes the determination of an appropriate asset mix policy even more difficult.

An Asset Allocation Checklist

To systematically analyze the sometimes conflicting forces impacting on long term pension fund asset allocation, a checklist is useful. The checklist in TABLE II below addresses 4 of the 5 key going-concern asset allocation questions we posed above. For the sake of realism, we have both a private sector plan sponsor and a public sector plan sponsor answer the questions....the former on behalf of the ALPHA Corporation pension plan....the latter on behalf of the PSRS (Public Sector Retirement System) [12]. Neither plan sponsor is real....but their situations are realistic. We address the 'capital market prospects' question separately later in the article.

TABLE II: ASSET ALLOCATION CHECKLIST

I. THE 'GOING-CONCERN DEAL'

ALPHA	PSRS
* benefit accruals formally indexed pre-retirement up to 50% of final pay...'ad hoc post-retirement (60% of CPI is target) updates... ...no explicit tie between pension fund performance and inflation updates	* benefit accruals formally indexed pre-retirement up to 75 % of final pay...post retirement updates tied to pension fund performance (return in excess of 3% becomes inflation update subject to a 100% of CPI upper bound and a 0% of CPI lower bound)
* the plan is non-contributory and is being funded on a 7.5%/6.0% basis (investment return/wage growth) leading to a 8% 'normal' contribution rate....inflation updates do not increase the contribution rate unless the updated funding target exceeds the value of plan assets... contribution rate reduced if plan assets exceed funding target by a certain percentage	* the plan is contributory (50%/50%), and is being funded on a 3.0%/1.5% (investment return/wage growth) basis, leading to a 20% 'normal' contribution rate....this contribution rate is adjusted up or down depending on plan economic funded status (ie plan assets at market, plan liabilities estimated on a 3.0%/1.5% return/salary increase basis)

II. THE 'TERMINATION DEAL'

ALPHA	PSRS
* in a voluntary plan termination situation, ALPHA would offer plan members the better of two calculations....the present value of projected benefits calculated on a 7.5% basis for inactive liabilities and a 7.5%/6.0% basis for actives....the alternative calculation for actives is the accumulated value of contributions, credited the riskfree rate of interest....ALPHA would own any asset surplus or owe any asset deficiency	* this situation has not been explicitly contemplated....any termination settlement would have to be negotiated between the government and the unions involved (such negotiations would likely lead to a settlement based on the 3.0%/1.5% experience assumptions basis with any asset surplus or deficiency split 50/50)

III. ASSET AND LIABILITY VALUE FLUCTUATIONS

ALPHA	PSRS
* ALPHA recognizes that on a going-concern economic basis, it should include a 2.5% (ie 60% of 4%) inflation factor....implying the use of 5.0%/3.5% experience assumptions to estimate the going-concern economic liability....plan assets will fluc-	* calculated on a 3.0%/1.5% basis, the going-concern liability will progress smoothly over time.... plan assets will fluctuate depending on their sensitivity to changes in economic expectations and capital market psycology

tuate depending on their sensitivity to changes in economic expectations and capital market psycology	
* *ALPHA's management is satisfied that the new accounting rules can be employed in a way that the financial status of its retirement system can be represented in an unbiased way... and that through the available smoothing mechanisms, no year-to-year surprises will be encountered*	* *the new private sector accounting rules are irrelevant to the PSRS situation....however, asset value smoothing will be used for disclosure and contribution rate calculation purposes*

IV. MAIN BUSINESS/PENSION PLAN PLANNING AND BALANCE SHEET INTEGRATION

ALPHA	***PSRS***
* *ALPHA wants to focus on 'cashflow integration' rather than 'tax structure integration'....in other words, it does not want to have to make extra contributions when it is least able to do so (ie liabilities rising faster than expected as the value of plan assets and corporate earnings are falling)*	* *Government is interested in the correlation between tax revenues and the required pension plan contribution....it wants to avoid the need to make extra contributions at a time when tax revenues are falling (ie as tax revenues are falling, and plan assets are falling, plan liabilities are rising faster than expected)*
* *ALPHA understands the tax arbitrage argument but has decided not to 'play' it....in other words, it has decided not to reshuffle corporate and pension assets and liabilities between the main business and pension plan balance sheets....mainly because such activity would signal the corporation is engaged in a form of not-easy-to-explain form of gaming the tax authorities and because it believes financial analysts and rating agencies might misinterpret such moves*	* *the tax arbitrage consideration is irrelevant in the PSRS context unless the issuance of tax-exempt bonds is a realistic option*

The Checklist Responses: Implication For Asset Mix Policy

The checklist responses contain strong messages for asset mix policy. If the ALPHA and PSRS responses are representative for private and public sector plan sponsors [13], the implications are:

1. The long term nature of pension fund investing is confirmed in the sense that the primary planning mode is 'ongoing', rather than 'termination'. A corrolory is that any segmentation of the liabilities into 'retired lives' and 'actives' is unnecessary and possibly even misleading [14].

2. Investment risk, whether viewed in its 'ongoing' or 'termination' dimensions, has a 'real' rather than 'nominal' focus because pension benefits have a 'real' rather than a 'nominal' focus:

   (a) in its 'ongoing' dimension, risk relates to the impact of negative real returns on future contribution rates
   (b) in its 'termination' dimension, risk relates to the volatility of the market value of pension assets in relation to the settlement value of the pension liability....this liability will not necessarily be sensitive to changes in nominal interest rates, depending on the nature of the 'termination' deal

   (c) in either dimension, risks may be shared rather than borne purely by either the plan sponsor or plan members

3. Despite the long term nature of pension fund investing, shorter term changes in the economic going-concern balance sheet matter because:

   (a) such changes trigger changes in contribution rates and hence the disposition of future stakeholder (ie plan sponsor, plan member, or both) cashflows

   (b) such changes affect the value of the plan sponsor's own securities and hence its cost of debt and equity capital

   (c) if there is a plan termination, settlement could be related to the economic rather than the legal termination liability

4. There is a strong basis for looking at the relationship between the nature and source of sponsor cashflows and pension fund returns. For example, if sponsor cashflows are negatively affected by changes in the inflation rate, all the more reason to invest in inflation hedges in the pension fund. Conversely, if sponsor cashflows are more negatively impacted by economic recession, more emphasis should go to putting recession hedges in the pension fund.

Capital Markets Prospects

Capital market prospects matter in the 'economic going-concern' planning context because this context recognizes that ongoing pension benefit payments can come from only two sources: (1) contributions into the pension fund and (2) investment earnings on those contributions. Further, the more there is of the latter, the less there has to be of the former. We suggested above, for example, that an incremental 300 Basis Points of pension fund return could halve required contribution rate for a typical defined benefit pension plan.

What are reasonable long term capital market prospects today? Answers to this question always reflect a blend of historical experience, the structure of capital markets yields and prices at the point in time the question is posed, and any forward-looking judgements the forecaster is prepared to make at that point in time. The numbers in TABLE III below reflect 'equilibrium' long term capital markets prospects in the spirit of the work done by Ibbotson, Siegel, Brinson, Diermeier, Schlarbaum et al [15].

TABLE III: LONG TERM REAL RETURN PROSPECTS

	Long Term Real Return Implication
1. *By its very nature, a properly invested, diversified pool of venture capital investments should always have the best long term return prospects. Studies suggests 15% real return experience is common over the last 10 years:*	*15%*
2. *Diversified pools of commercial real estate are being priced on a 7% cash yield basis in mid-1987. It is not unreasonable to project maintainance of the purchasing power of this cash yield over the long term through increased rents:*	*7%*
3. *Common stock prices have now been bid up to a point where it is difficult to see the long term historical 7% real return prospectively. A 3% cash yield plus 3% long term real economic growth prospects lead to real return prospects of:*	*6%*
4. *Long bonds still offer historically high real return prospects measured against current inflation experience....without strong views as to whether long term inflation will average out above or below today's experience, the prospect is:*	*3.5%*
5. *T-Bills also still offer historically high real returns today. But real returns over the long term should decline back to more normal levels.*	*1.5%*

Capital Market Prospect Implications

On a prospective returns basis, equity-oriented investments should permit a pension plan to meet its obligations with the lowest contribution rate over the long run. Within the equity investment sphere, common stocks offer liquidity at the price of somewhat lower prospective returns relative to real estate and considerably lower returns in relation to venture capital.

We noted above that in a going-concern mode downdrafts in pension plan assets values still matter....such downdrafts can lead to higher contribution rates, can affect the value of plan sponsor securities (and hence its cost of capital), and decrease the benefit security of plan members.

When are diversified portfolios of equity investments most likely to suffer material downward revisions in value? During periods of high stock valuation followed by a major decline in economic activity.....likely a time when inflation rates are falling, long term interest rates on high quality bonds are falling, and hence the prices of these bonds are rising. Thus in a going-concern mode, the rationale for high-quality bonds is not immunization, but fund capital value protection during periods of sharply falling equity values.

For example [16], $1 invested in stocks in 1929 would have been worth 36 cents four years later (while there are no numbers for real estate or venture capital for this period, investors no doubt suffered major losses in these equity classes as well). Over that same four year period, $1 invested in long bonds would have increased to $1.19. The consumer price index dropped 20% in the 1929-1932 time period. A 40% stocks-60% bonds asset mix would have roughly maintained the real value of a pension fund over this 4 year period.

Bonds And Inflation Risk

While bonds can save a pension fund during unanticipated major declines in economic activity, they can seriously erode the real value of pension assets during periods of rising inflation. For example, $1 invested in long bonds in 1978 would have been worth 98 cents four years later. But with the CPI rising 48% over the 1978-1981 period, the loss in real terms was more like 50%. A $1 invested in stocks over the same four year period would have increased to $2.19. Again, a 40% stocks-60% bonds asset mix would have roughly maintained the real value of the pension fund over this 4 year period.

Is the 40% Stocks/60% Bonds mix the minimum risk (against economic going-concern liabilities) pension fund asset mix policy for all seasons then? Not necessarily....in the stagflation world of the mid-1970s stocks and bonds both had negative real rates of return. During this period only exposure to real estate, venture capital, and foreign investments would have maintained the real value of the pension fund [17].

A Forward-Looking Asset Mix Policy

Having already ranked the eligible asset classes in terms of long term return prospects, long term asset mix policy becomes a question of real return risk and how to best defend against it. We postulate how a diversified equity-oriented portfolio (say 10% venture capital, 30% real estate, 40% domestic stocks, 20% foreign stocks) and a high-quality long bond portfolio (say 20 year zero coupons) might perform in three 'bad news' scenarios below. The three 'bad news' scenarios are generalizations of the 1929-1932 (Deflation), late 1960's to mid-1970's (Stagflation), and 1978-1981 (Rising Inflation) periods. Implications for three (80/20, 60/40, 40/60) equity/bond mixes are also shown in TABLE IV [18].

TABLE IV: WAYS IN WHICH THINGS MIGHT GO WRONG OVER THE NEXT 4 YEARS

Possible 'Bad News' Scenarios	*100% Equity*	*100% Bonds*	*80%/20%*	*60%/40%*	*40%/60%*
	(numbers reflect cumulative four year real returns)				
Deflation	*-40%*	*+60%*	*-20%*	*0%*	*+20%*
Stagflation	*+10%*	*-10%*	*6%*	*2%*	*-2%*
Rising Inflation	*+10%*	*-50%*	*-2%*	*-14%*	*-26%*

Observations:

1. Clearly, the 'swing' scenarios are Deflation and Rising Inflation. Here is where the diversified equity-oriented portfolio and the long bond portfolio real return projections have to be at least of the right order of magnitude.

2. The projections are consistent with capital markets experience during periods of economic conditions similar to those being postulated. Recall that the equity portfolio has only 40% domestic common stocks in it. We would have been considerably more uncertain about equities in all three scenarios without the equity portfolio's 60% exposure to venture capital, real estate, and foreign stocks.

3. While the 100% bond portfolio might be risk-minimizing against 'legal termination pension liabilities', it is at least as risky as a 100% equity-oriented portfolio against 'economic going-concern pension liabilities'. These latter liabilities do not decline or rise in line with rising or falling nominal interest rates.

4. The risk-minimizing (in the sense of balancing off Deflation and Rising Inflation bad news) asset mix policy against 'economic going-concern pension liabilities' is no longer 40/60. This balance is now struck at about 70/30 if (a) the Deflation and Rising Inflation outcomes are deemed to be equally likely, and (b) the 'pain'of about a 10% decline in the real value of pension assets is the same in both Deflation and Rising Inflation.

5. Would the use of T-Bills help get the downside get back to a 0% real rate of return? This is equivalent to asking if shortening the duration of the bond portfolio would be of help. The answer is "yes". By reducing the equity weighting back to 40% and reducing the duration of the bond component from 20 years to about 3 years, prospective real return equivalence in Deflation and Rising Inflation is reestablished at 0%.

6. In terms of prospective long term real return (taking weighted averages from the LONG TERM REAL RETURN PROSPECTS table above), the 70/30 equity/long bond mix works out to 6.1% versus 4.0% on the 40/10/50 equity/bond/T-Bill mix. This 210 Basis Points return differential translates into a potential 30-40% differential in the contribution rate required to support a typical defined benefit pension plan[19].

Will the Alpha Corporation Pension Plan and the Public Service Retirement System Trustees adopt the 70/30 asset mix policy? Or the more conservative 40/10/50 policy? Or something in between? We turn to these questions next.

Deliberations At ALPHA Corporation

ALPHA's plan is a pure non-contributory defined benefit pension plan. Appropriately then, plan governance is under the control of ALPHA Corporation, with its management required to behave prudently and to have due regard for their obligation to maintain plan solvency. TABLE V details their asset mix policy deliberations.

TABLE V: ALPHA CORPORATION PENSION PLAN

THE ASSET ALLOCATION CHECKLIST

I. The 'Going-Concern Deal'

- *The plan has a 'final earnings' based benefit formula and ALPHA has a long history of providing 'ad hoc' inflation updates averaging 60% of CPI. These two factors together suggest ALPHA should look at risk and return in real terms on the asset side of the balance sheet.*

- *The plan is non-contributory and there is no ambiguity that good investment results lead directly to lower plan contributions by the employer....just as bad investment results will lead to higher contributions by the employer.*

II. The 'Termination Deal'

- *In any plan termination other than corporate bankruptcy, the 'settlement value' of accrued pensions would be above the 'legal termination liability' and would not fluctuate in line with fluctuations in long bond values and yields. The probability of plan termination is judged to be very low.*

III. Asset And Liability Value Fluctuations

- *ALPHA management deems the 'economic going-concern' balance sheet to be the one which will guide their asset mix policy decision. The plan now has about a 15% 'going-concern' asset cushion (ofcourse its 'legal termination' asset cushion is considerably larger). ALPHA policy is to increase the corporate contribution rate if the 'going-concern' cushion goes negative.*

- *ALPHA management is well aware that it might be appropriate or even necessary to report different asset and liability numbers to the regulatory authorities and in its financial statements. These numbers will likely be a smoothed blend of the 'legal termination' and 'economic going-concern' balance sheets.*

IV. Degree Of Main Business/Pension Plan Decisions Integration

- *The key question for management here is whether ALPHA's main business would fare worse in the 'Deflation' or 'Rising Inflation' scenario....(if one was decidedly worse for ALPHA than the other, it would be logical to 'buy' more protection against it in the pension fund). After considerable deliberation, they decided the main business would be equally hurt by 'Deflation' or 'Rising Inflation'....assuming the latter brought significant increases in real labour costs with it. Also, they decided they were not prepared to guess whether one scenario was more likely to occur than the other. In conclusion, they decided they would not bias their asset mix policy decision due either consideration.*

- *Management also decided not to engage in any pension plan-related tax arbitrage by reshuffeling main business and pension plan assets and liabilities in an attempt to reduce corporate taxes payable.*

V. Capital Markets Prospects

- *A diversified equity-oriented policy has a long term prospective real return in the 6%-7% range. But even when combined with a 30% long bond position, such an asset mix policy could lead to declines in the real value of the pension fund in the 10% range over the next four years.*

- *Better downside protection involves jointly reducing equity exposure and the duration of the debt component of the fund.*

THE ASSET ALLOCATION DECISION

THE COMBINATION OF ALPHA CORPORATION'S GOING-CONCERN FOCUS, A HEALTHY 'GOING-CONCERN' PENSION PLAN BALANCE SHEET, AND THE POTENTIAL OF BEING ABLE TO FUND A COMPETITIVE PENSION PLAN WITH A LONG TERM CONTRIBUTION RATE IN THE 4% OF PAY AREA, LEAD ALPHA TO DECIDE TO PURSUE THE 70-30 ASSET MIX POLICY. THE 70% EQUITY COMPONENT IS DIVERSIFIED ACROSS VENTURE CAPITAL, REAL ESTATE, AND DOMESTIC AND FOREIGN STOCKS. THE 30% DEBT COMPONENT IS TO BE IN LONG DURATION, HIGH QUALITY BONDS.

Deliberations At The Public Sector Retirement System

Unlike the ALPHA Corporation situation, investment risks and rewards are shared in the Public Sector Retirement System. They are shared by the tax-paying public, active public sector employees, and inactive/retired public sector employees. The composition of the Board of Trustees reflects this risk-sharing reality. TABLE VI below sets out their asset mix policy deliberations.

TABLE VI: PUBLIC SECTOR RETIREMENT SYSTEM

THE ASSET ALLOCATION CHECKLIST

I. The 'Going-Concern Deal'

- *The pension plan has a 'final earnings' based benefit formula. The plan also has a post-retirement inflation update formula tied to pension fund performance (return in excess of 3% becomes the inflation update subject to a 100% of CPI upper bound and a 0% of CPI lower bound). Thus risk and return should be analyzed in both nominal and real terms on the asset side of the balance sheet.*

- *Plan contributions are shared 50/50 by the employer and active employees. Thus through the contribution formula and through the link between inflation updates and pension fund performance, all stakeholders share in both good and poor investment performance.*

II. The 'Termination Deal'

- *There is no formal agreement in place as to what would happen in case of a plan termination. But with the best estimate of the 'going-concern' liability outstripping the value of plan assets by 30%, negotiations would surely focus on how much the 'settlement value' of the benefits exceeded the value of plan assets. But with no intent on the part of the employer to terminate, all this is very hypothetical.*

III. Asset And Liability Fluctuations

- *With the liability being calculated on a 3% discount rate basis, it will progress smoothly (assuming a steady-state plan membership size and composition) over time. The plan asset value in relation*

to this 'economic going-concern' liability value is material because the gap between the two affects the contribution rate. The 'normal' contribution rate is 20% of pay. But the actual current contribution rate is 25% (12.5% each for the employer and the employees) of pay, reflecting the amortization of the sizable unfunded past service liability. Poor investment experience would widen the asset-liability gap further, further increasing the required contribution rate for the employer and active employees.

- *Poor investment experience also affects pensioners. If the nominal fund return is below 3%, pensioners get no inflation update regardless of what the actual inflation rate was over the measurement period. Pensions-in-pay are updated for inflation experience by the amount fund return exceeds 3%, up to a maximum of 100% of CPI. Thus possible asset mix policy choices have to be tested for impact on inflation updates to pensioners.*

IV. *Degree Of Government/Pension Plan Decisions Integration*

- *In assessing if 'Deflation' and 'Rising Inflation' would be equally problematic 'bad news' scenarios for the government (ie the plan sponsor in this case), the decision was 'no'. 'Deflation' would decidedly be the worse of these two bad worlds. In this scenario, the government would be faced with falling tax revenues, rising demands in its financial resources, while still being obliged to make interest payments on its outstanding high coupon long term debt.*

- *While active employees feel they would be equally hurt by a rising contribution rate in the two 'bad news' outcomes, pensioners fear the 'Rising Inflation' scenario more. It is in this scenario they run the risk that pension fund returns won't be adequate to protect the real value of their pension.*

V. *Capital Markets Prospects*

- *While the prospective long term 6%-7% real rate of return associated with the 100% equity-oriented policy is very attractive, the consequenses of a 'Deflation' outcome with this policy are unacceptable to the employer (ie the government). The government believes the plan has to trade off some long term return for better 'Deflation' protection by lowering equity exposure and increasing long bond exposure.*

THE ASSET ALLOCATION DECISION

THE TRUSTEES OF THE PUBLIC SECTOR RETIREMENT SYSTEM AGREE TO SET THE ASSET MIX POLICY AT 50-50. THE 50% EQUITY COMPONENT IS TO BE DIVERSIFIED ACROSS VENTURE CAPITAL, REAL ESTATE, AND DOMESTIC AND FOREIGN STOCKS. THE 50% DEBT COMPONENT IS TO BE IN MEDIUM DURATION, HIGH QUALITY BONDS. THIS POLICY SHOULD EVENTUALLY MOVE THE JOINT EMPLOYER-EMPLOYEE CONTRIBUTION RATE FROM THE CURRENT 25% OF PAY TO AN EVENTUAL 10% OF PAY. PENSIONS SHOULD BE MAINTAINED IN REAL TERMS IN ALL BUT THE WORST INFLATION SCENARIO.

Asset Allocation Decision Details

There is more to APLHA's and PSRS's asset mix policy decisions than what is in TABLES V and VI above. For example, the degree of 'give' in the policies will have to be decided, with special emphasis on whether any attempt is to be made to shift the asset mix based on shorter term market anticipations. If the answer is 'yes', the double question "who will do it with how much money?" will require a lot of careful study [20].

Another important consideration are the plan's likely evolving liquidity needs. Even in a 'going-concern' mode, material changes in the size and composition of plan membership, and in the relationship between money flowing into the plan and out of the plan can take place. Such potential changes also need careful study. It is not acceptable for a pension plan to have the perfect long term asset mix policy but not to be able to write checks when it has to because it has no cash!

The End Of A Long Story

We have taken a long time to make the point that pension fund asset allocation can not proceed until plan sponsors decide how they are going to treat the pension liability. If a sponsor gives it the 'legal termination' interpretation, then this article will not help them formulate an asset mix policy. In this case, it is the referenced Leibowitz articles which the sponsor should once again study carefully.

This article is for sponsors which decide to treat pension liabilities as 'economic going-concern' liabilities the way that ALPHA Corporation and The Public Sector Retirement System did. It makes the crucial point that for these plans, a long duration fixed-rate bond portfolio is far from a risk-free asset. In fact, there is no asset which perfectly immunizes 'economic going-concern' pension liabilities....but, as

we saw with the ALPHA and PSRS cases, asset mixes in the 70% equities-30% fixed income to 40% equities-60% fixed income range offer significant real return downside protection over 3 to 5 year investment horizons. Thus the typical '50-50' Canadian pension fund asset falls well within the range 'prudent persons' can, and indeed should consider.

While the fiduciaries of a given plan are required to only consider the economic interests of the stakeholders in that plan, they might still reflect on one final thought. A wealth-creating economy needs regular injections of patient, long term risk capital. Pension funds are ideal providers of this type of capital if they are investing against 'economic going-concern' pension liabilities. Against 'legal termination' liabilities, pension funds are reduced to being lenders to issuers of high-quality fixed rate debt.....namely, the public sector.

Thus the choice of which pension liability to invest against goes beyond being simply a micro pension finance issue. The choice could also have a material impact on the Canadian economy's ability to actually deliver adequate retirement income down the road.

FOOTNOTES

[1] FASB Statements 87 and 88 and CICA Handbook Section 3460 set out how defined benefit pension plans are to treated in corporate financial statements in the USA and Canada respectively. Their appearance has created somewhat of a dilemma for many Chief Financial Officers: do you let the accounting rules drive the economics of your pension plan....or do you make the economics drive the rules? CFOs making the latter choice are finding there are ways to make the rules (and the accountants who wrote them) fit the economics where the CFO has thought through the economics. This article endeavours to contribute to that thinking-through process.

[2] Richard A. Ippolito, THE ECONOMIC BURDEN OF CORPORATE PENSION LIABILITIES, Financial Analysts Journal, January-February 1986. His book PENSIONS, ECONOMICS, AND PUBLIC POLICY , Dow Jones-Irwin 1986, further elaborates on the distinction between what Ippolito calls 'true' and 'legal' pension liabilities.

[3] D. Don Ezra and Keith P. Ambachtsheer, PENSION FUNDS: RICH OR POOR?, Financial Analysts Journal, March-April 1985.

[4] Ippolito, for example, argues that if workers forego the present value-equivalent of ongoing rather than termination benefits as the non-current portion of a total compensation package, there is an implicit contract to provide ongoing benefits (see [2] above). Terminated employees and/or their unions have made this argument in a number of courtcases arising out of plan terminations. In the recent Dominion Stores case in Ontario where the employer had already received the termination surplus, the court ordered the money to be returned to the trustee until it ruled on the merits of the employees' case. An out-of-court settlement resulted with the employer and

plan memebers splitting the termination surplus 50/50. How Ontario decides to deal with the issue of termination and going-concern surpluses from a regulatory viewpoint (probably in 1988 along with the inflation protection issue) will have a major impact on the future of defined benefit plans registered in the Province. A provincial Task Force is currently studying these issues and is to make recommendations by December 1987.

[5] Martin L. Leibowitz, THE DEDICATED BOND PORTFOLIO IN PENSION FUNDS-PART I: MOTIVATIONS AND BASICS, Financial Analysts Journal, January-February 1986. Martin L. Leibowitz, THE DEDICATED BOND PORTFOLIO IN PENSION FUNDS-PART II: IMMUNIZATION, HORIZON MATCHING, AND CONTINGENT PROCEDURES, Financial Analysts Journal, March-April 1986. Martin L. Leibowitz, TOTAL PORFOLIO DURATION: A NEW PERSPECTIVE ON ASSET ALLOCATION, Financial Analysts Journal, September-October 1986. Martin L. Leibowitz, PENSION FUND ASSET ALLOCATION THROUGH SURPLUS MANAGEMENT, Financial Analysts Journal, March-April 1987. Martin L. Leibowitz, LIABILITY RETURNS: A NEW LOOK AT ASSET ALLOCATION, The Journal Of Portfolio Management, Winter 1987.

[6] But see Footnote [4] above. It might be unwise to assume the current status of the plan termination surplus ownership issue is a permanent one.

[7] Leibowitz calculates durations of about 6 years for retireds and 13 years for actives in the sample pension plan he uses in the JPM article referenced in Footnote [5] above.

[8] Susan L. Malley and Susan Jayson, WHY DO FINANCIAL EXECUTIVES MANAGE PENSION FUNDS THE WAY THEY DO?, Financial Analysts Journal, November-December 1986. In my book (Keith P. Ambachtsheer, PENSION FUNDS AND THE BOTTOM LINE, Dow Jones-Irwin 1986) I also make the fundamental assumption that employer pension plans are 'going-concern' financial entities....and

should be managed that way.

[9] This question forces the issue of whether economics will drive accounting or accounting will drive economics right up front. We have already conceded that there will be cases where the economics dictate a 'termination' rather than 'going-concern' view of the world. In these latter cases, shorter term fluctuations in the value of the plan termination surplus are likely to be important. Hence paying a premium to insure its value becomes a potentially attractive economic proposition.

[10] This leverage of the long term real return on assets on the required contribution rate reflects the long duration of 'economic going-concern' pension liabilities: durations in excess of 20 years are not uncommon. The numbers used are illustrative only. PC-based pension liability valuation systems now exist to do such calculations for specific plans in minutes if not seconds.

[11] Once one begins to study what actual pension 'deals' exist out there between specific employers and their current and inactive employees, the popular notion that there are only two possible 'deals' between them (ie pure defined benefit or pure defined contribution) shatters very quickly. There are in fact many 'deals'. Unfortunately, employers and employees don't always have the same view of what that 'deal' is. Even more unfortunately, rather than solving disputes through arbitration or even the courts, politicians are sometimes brought into these disputes. If this involvement end up constraining the range of compensation formula options open to employers and employees by law, economic efficiency will suffer. This problem is compounded when (as is usually the case), the government is itself a large employer.

[12] Readers wanting more detail on ALPHA Corporation are referred the book PENSION FUNDS AND THE BOTTOM LINE (see Footnote [8]). We believe its pension 'deal' to be quite reflective of many actual US and Canadian private secto pension 'deals'. The reason for introducing a public sector employer separately is to show that the pension 'deal' there may be quite different than in the private sector. While the actual 'deal' described is hypothetical, it in fact reflects that of at least two large Canadian public sector employer pension plans quite closely. Another Ontario Task Force is studying the whole question of public sector pension fund investing in the Province. It is to make its recommendations in September 1987.

[13] We have already indicated that we believe they are. See Footnotes [8] and [12].

[14] Active lives/retired lives segmentation was ofcourse central to the 'retired lives immunization' wave that swept the pension industry a few years ago. For 'retired lives immunization' to make economic sense, one of two conditions must hold: (1) the plan sponsor must be willing to literally discharge its obligations to inactive plan members through the purchase of annuities or (2) the plan sponsor must be certain that pensions-in-pay will never be adjusted for actual inflation experience. In fact, while we are not aware of precise statistics on the prevalence of these conditions, the vast majority of plan sponsors have <u>not</u> bought their way out of their retired lives obligations....and the vast majority of plan sponsors <u>do</u> provide inflation-related updates to pensions-in-pay.

[15] For a fully-developed set of capital markets expectations using this history/current prices/forward-looking judgements blend, see Gary P. Brinson, Jeffrey J. Diermeier, and Gary G. Schlarbaum, A COMPOSITE

PORTFOLIO BENCHMARK FOR PENSION PLANS, Financial Analysts Journal, March-April 1986, and Roger Ibbotson, Laurence Siegel, THE WORLD MARKET WEALTH PORTFOLIO, Journal of Portfolio Management, Winter 1983. The numbers used in this article were developed using the 'equilibrium' framework described in these articles. Not surprisingly, our numbers (developed in further detail in our own research publication THE AMBACHTSHEER LETTER) bear a close resemblance to those published in the 1986 FAJ article cited above. Historical relationships are an important (but not the only) part of 'equilibrium' capital markets analysis. In Canada, the Canadian Institute of Actuaries in its CANADIAN ECONOMIC STATISTICS publication publishes historical data going back to 1924. James Hatch and Robert White have conducted a more detailed study of the 1950 to 1983 period in CANADIAN STOCKS, BONDS, BILLS AND INFLATION 1950-1983, The Financial Analysts Federation, 1985.

[16] The 1929-1932 and 1978-1981 examples were developed from Canadian capital markets and inflation experience using the CANADIAN ECONOMIC STATISTICS data base of the Canadian Institute Of Actuaries. While the numbers would have been somewhat different with US data, the conclusions would not.

[17] Our observations ofcourse relate to the underlying covariance structures of real rates of return. If covariance structures shift with changes in economic eras (ie from a period rising inflation to deflation, for example), covariance statistics generated over periods which include more than one such era will have no predictive content. We believe that much can be learned by carefully studying actual capital markets behavior within pre-defined periods of economic history....and conversely, by studying the economic environment during pre-defined periods of capital

markets history.

[18] For the reasons set out in Footnote [17] above, we continue with the 'scenario approach' to look at prospective 'economic going-concern' balance sheet risk and contribution rate risk for sponsors of defined benefit pension plans. Readers are invited to put their own estimates into TABLE IV to see if such estimates would change any of the 6 observations we make below TABLE IV.

[19] To arrive at Conclusions 5 and 6, we assumed that T-Bills might do about 20% cumulatively over 4 years in Deflation and 0% in Rising Inflation. By 40/10/50 we mean a 40% equity-oriented/10% long bond/50% T-Bill mix....implying about a 3 year duration for the 60% debt portion. The conversion of the 210 Basis Point return differential into a 30-40% contribution rate differential is again just suggestive of the order of magnitude involved....see Footnote [10] for more on this long term return/contribution rate sensitivity.

[20] Much has been written about market timing. An especially illuminating article is that of Robert D. Arnott and James N. von Germeten, SYSTEMATIC ASSET ALLOCATION, Financial Analysts Journal, November-December 1983. The point we make here is that market timing should not be confused with deciding on target asset mix policy weights in the context of investing against 'economic going-concern' pension liabilities.